

REMARKS

In the Office Action the Examiner noted that claims 12-16 and 22-25 are pending in the application, and the Examiner rejected all claims. By this Amendment, claims 12 and 22 have been amended, and claims 13 and 23 have been cancelled without prejudice or disclaimer. No new matter has been presented. Thus, claims 12, 14-16, 22, and 24-25 are pending in the application. The Examiner's rejections are traversed below, and reconsideration of all rejected claims is respectfully requested.

Claim Rejections Under 35 USC §103

In item 3 on pages 2-3 the Examiner rejected claims 12-14 under 35 U.S.C. §102(a) as being unpatentable over U.S. Patent No. 5,837,568, issued to Yoneda et al. (hereinafter referred to as "Yoneda") in view of U.S. Patent No. 5,568,288, issued to Yamazaki et al. (hereinafter referred to as "Yamazaki").

Claim 12 of the present application, as amended, recites:

A thin film transistor (TFT), comprising:
a substrate;
a semiconductor layer formed over said substrate having end portions;
a first insulating layer disposed on said semiconductor layer so as to expose ones of the end portions of said semiconductor layer;
a gate electrode formed over said first insulating layer;
a capping layer formed over said gate electrode;
spacers formed over said first insulating layer and on both sidewall portions of said gate electrode and said capping layer;
high-density source and drain regions formed at the ones of the end portions of said semiconductor layer exposed beyond said spacers, the high-density source and drain regions spaced apart from the gate electrode and the capping layer;
low-density source and drain regions having a same conductivity as said high-density source and drain regions formed at regions of said semiconductor layer under said spacers between the gate electrode and the high-density source and drain regions, wherein said semiconductor layer has lightly doped drain (LDD) regions under said spacers; and
source and drain electrodes which directly contact, respectively, and without contact holes, said high density source and drain regions.

Therefore, the thin film transistor of claim 12 recites "low-density source and drain regions having a same conductivity as said high-density source and drain regions formed at regions of said semiconductor layer under said spacers between the gate electrode and the high-density source and drain regions, wherein said semiconductor layer has lightly doped drain (LDD) regions under said spacers." In other words, these lightly doped drain regions are formed

only under the spacers of the TFT. This allows for a simplified manufacturing process of the TFT, because the spacers and capping layer are themselves used to mask the LDD regions from the doping process that produces the high-density source and drain regions of the TFT.

This is in direct contrast to Yoneda, in which the low-density source and drain regions extend beyond the side walls 15 that the Examiner has characterized as “spacers” (Figure 12F). Figure 12F shows that the low-density regions 11L extend well beyond these side walls 15, which also results in the requirement of an extra mask to be used in the manufacturing process of the TFT disclosed in Yoneda. Because the low-density regions 11L are not confined to the area under the side walls 15, a resist layer R is used to mask the low-density regions 11L when doping the high-density layers 11S and 11D (Column 13, Lines 53-64). Therefore, unlike claim 12 of the present application, Yoneda does not disclose “lightly doped drain (LDD) regions under said spacers” and “high-density source and drain regions formed at the ones of the end portions of said semiconductor layer exposed beyond said spacers.”

Further, this deficiency of Yoneda is not cured by the disclosure of Yamazaki. In Yamazaki, high-density regions of the semiconductor layer are formed without the use of spacers at all (Figure 22). Also, Yamazaki does not disclose forming low-density regions along with the high-density regions (Figure 22).

Therefore, the combination of Yoneda and Yamazaki does not disclose all of the features recited in claim 12 of the present application, and claim 12 patentably distinguishes over the cited references. As such, the Applicant respectfully requests the withdrawal of the §103(a) rejection.

Claim 13 has been cancelled without prejudice or disclaimer.

Claim 14 depends from claim 12 and includes all of the features of that claim plus additional features which are not taught or suggested by the cited references. Therefore, it is respectfully submitted that claim 14 also patentably distinguishes over the cited references.

In item 4 on pages 3-5 of the Office Action the Examiner rejected claims 22 and 23 under 35 U.S.C. §103(a) as being unpatentable over Yoneda in view of Yamazaki.

Claim 22, as amended, recites “low-density source and drain regions having a same conductivity as said high-density source and drain regions formed at off-set regions of said semiconductor layer under said spacers so as to have said semiconductor layer with lightly doped drain (LDD) regions under said spacers.” As previously discussed, this feature is not disclosed in Yoneda and Yamazaki, either alone or in combination. Therefore, it is respectfully

submitted that claim 22 also patentably distinguishes over the cited references.

Claim 23 has been cancelled without prejudice or disclaimer.

In item 5 on page 5 of the Office Action the Examiner rejected claims 15-16 and 24 under 35 U.S.C. §103(a) as being unpatentable over Yoneda in view of Yamazaki as applied to claims 12 and 22 and further in view of JP 11261076 (Yamazaki et al., hereinafter referred to as "JP-076").

Claims 15-16 depend from claim 12, and claim 24 depends from claim 22. As stated above, claims 12 and 22 patentably distinguish over Yoneda and Yamazaki, and the deficiencies of Yoneda and Yamazaki are not cured by JP-076. Therefore, it is respectfully submitted that claims 15-16 and 24 also patentably distinguish over the cited references.

In item 6 on pages 5-6 of the Office Action the Examiner rejected claim 25 under 35 U.S.C. §103(a) as being unpatentable over Yoneda in view of Yamazaki as applied to claim 22, and further in view of U.S. Patent No. 5,550, 066, issued to Tang et al. (hereinafter referred to as "Tang").

Claim 25 depends from claim 22. As stated above, claim 22 patentably distinguishes over Yoneda and Yamazaki, and the deficiencies of Yoneda and Yamazaki are not cured by Tang. Therefore, it is respectfully submitted that claim 25 also patentably distinguishes over the cited references.

No Motivation To Combine Yoneda and Yamazaki

Regarding the §103(a) rejections of claims 12 and 22, the Examiner acknowledges the fact that Yoneda does not disclose "source and drain electrodes which directly contact, respectively, and without contact holes, said high density source and drain regions." The Examiner goes on to state, however, that Yamazaki does disclose this feature that is not disclosed by Yoneda, and further that "it would have been obvious to one skilled in the art at the time the invention was made to incorporate Yamazaki's teachings with Yoneda's device since that would prevent flickering and display failure as taught by Yamazaki." The Applicant respectfully submits that there is no motivation to combine the two cited references, and respectfully traverses the rejection by the Examiner.

MPEP § 2142 states that "[w]hen the motivation to combine the teachings of the references is not immediately apparent, it is the duty of the Examiner to explain why the combination of the teachings is proper." Here, the Examiner has simply stated, with no evidence

to support the assertion, that “it would have been obvioussince that would prevent flickering and display failure as taught by Yamazaki.” However, the features of the claimed invention that are lacking in Yoneda, namely the “source and drain electrodes which directly contact, respectively, and without contact holes, said high density source and drain regions,” are not the source of the prevention of flickering and display failure, and therefore there would be no motivation to incorporate those elements into the disclosure of Yoneda. Yamazaki discloses a method of compensating for the variation in TFT characteristics by inputting a reference signal repeated in a certain cycle and having a signal level which varies during duration of the reference signal, performing gradation display in a digital method instead of the conventional analog method of gradation display (Column 2, Line 37 through Column 4, Line 9). “The present invention is characterized in that the clear digital gradation display is possible without changing the number of frames for re-writing the screen, by taking two kinds of driving frequencies” (Column 9, Lines 53-56). The Examiner has cited the one embodiment (Figures 21 and 22), out of several embodiments disclosed in Yamazaki that accomplish this method of gradation display, which appears to show electrodes formed in contact with the source and drain regions. However, this formation of the electrodes is not the source of the method, as is evidenced by the other several embodiments which perform the method without the physical structure of Figures 21 and 22. Therefore, the Applicant respectfully submits that there is no motivation to incorporate the cited formation of Yamazaki into the disclosure of Yoneda.

The Examiner is required to present actual evidence and make particular findings related to the motivation to combine the teachings of the references. In re Kotzab, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); In re Dembiczak, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999). Broad conclusory statements regarding the teaching of multiple references, standing alone, are not “evidence.” Dembiczak, 50 USPQ2d at 1617. “The factual inquiry whether to combine the references must be thorough and searching.” In re Lee, 61 USPQ2d 1430, 1433 (Fed. Cir. 2002) (citing McGinley v. Franklin Sports, Inc., 60 USPQ2d 1001, 1008 (Fed. Cir. 2001)). The factual inquiry must be based on objective evidence of record, and cannot be based on subjective belief and unknown authority. Id. at 1433-34. The Examiner must explain the reasons that one of ordinary skill in the art would have been motivated to select the references and to combine them to render the claimed invention obvious. In re Rouffet, 47 USPQ2d 1453, 1459 (Fed. Cir. 1998). Thus, as pointed out in In re Lee, the record must support motivation, i.e., there must be something in the record pointing out where the recited motivation can be found. In addition, there must be some discussion on how that purported motivation or suggestion is even relevant to the reference being modified.

"Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge generally available to one of ordinary skill in the art" (MPEP 2143.01). "The mere fact that references can be combined or modified does not render the resultant combination obvious unless the prior art also suggests the desirability of the combination." In re Mills, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990). The Applicant respectfully submits that there is no motivation to combine the references of Yoneda and Yamazaki to produce the TFT as recited in claims 12 and/or 22 of the present application, as well as the dependent claims that depend from claims 12 or 22, and respectfully requests the withdrawal of the 103(a) rejections for at least these reasons.

Summary

By this Amendment, claims 12 and 22 have been amended, and claims 13 and 23 have been cancelled without prejudice or disclaimer. No new matter has been presented. Thus, claims 12, 14-16, 22, and 24-25 are pending in the application.

It is respectfully submitted that the present claimed invention patentably distinguishes over the cited references. There being no further outstanding objections or rejections, it is respectfully submitted that the application is in condition for allowance. An early action to that effect is courteously solicited.

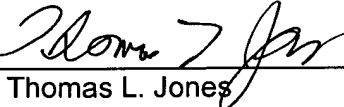
Finally, if there are any formal matters remaining after this response, the Examiner is requested to telephone the undersigned to attend to these matters.

If there are any additional fees associated with filing of this Amendment, please charge the same to our Deposit Account No. 19-3935.

Respectfully submitted,

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